

OPENMUSIC - LINUX-PORT

Anders Vinjar - Jean Bresson

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OUTLINE

- 1 OPENMUSIC INTRO
- 2 HISTORY AND MOTIVATION
- 3 THE OM-LINUX PROJECT
- 4 CONCLUSIONS AND PERSPECTIVES

OPENMUSIC INTRO

OpenMusic is :

- A visual programming language
- A computer-aided composition environment

G. Assayag, C. Rueda, M. Laurson, C. Agon, O. Delerue. "Computer Assisted Composition at Ircam: PatchWork & OpenMusic", Computer Music Journal, 23(3), 1999.

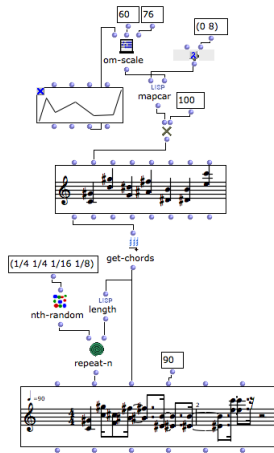


.. A VISUAL PROGRAMMING LANGUAGE



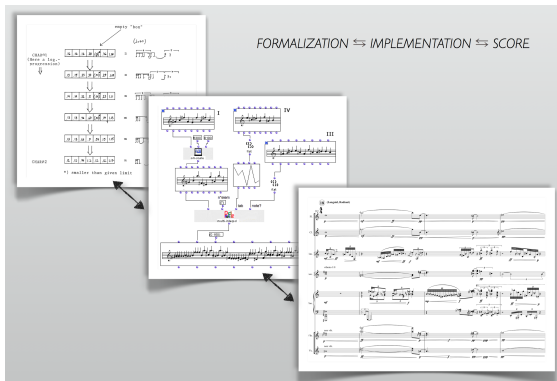
- Based on Common Lisp
- Off-line / demand-driven
- Local state, partial evaluations. . .
- Extended with editors, time structures

J. Bresson, C. Agon, G. Assayag. "Visual Lisp/CLOS Programming in OpenMusic" Higher-Order and Symbolic Computation, 22(1), 2009.



Music composition

FORMALIZATION \Leftrightarrow IMPLEMENTATION \Leftrightarrow SCORE



AN ENVIRONMENT FOR...

Music composition

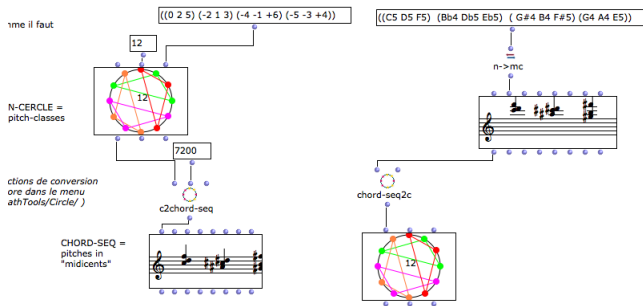
Contemporary composition = ill-defined

⇒ good CAC tool adapts well to human artistic processes, whatever those may be

Miller Puckette: "CAC is in effect making the computer carry out thought processes previously carried out in human brains"

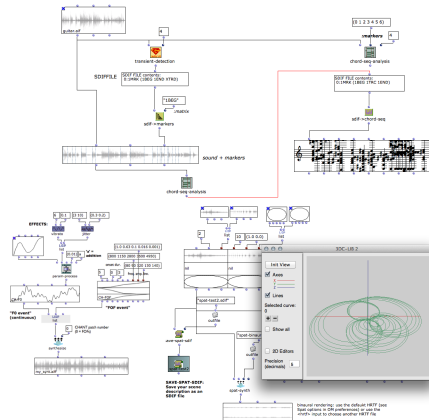
AN ENVIRONMENT FOR...

Music research and analysis

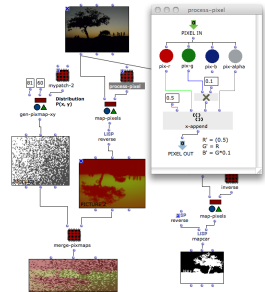
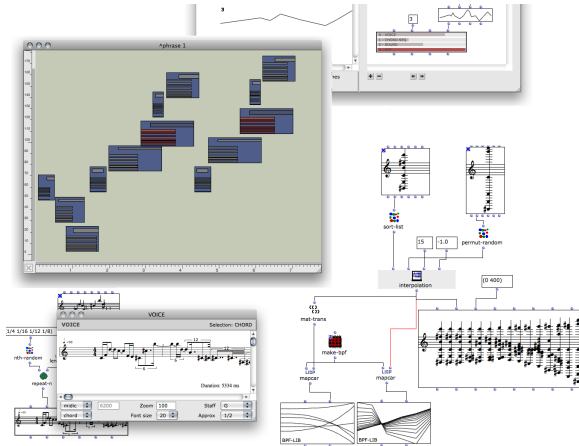


Control of DSP / synthesis tools

J. Bresson "*Spatial Structures Programming for Music*". Spatial Computing Workshop, 2012.



ETC...



J. Bresson, C. Agon, G. Assayag: "OpenMusic. Visual Programming Environment for Music Composition, Analysis and Research." ACM MultiMedia OpenSource Software Competition, 2011.

OM DEVELOPMENT VS. LINUX - QUICK HISTORY

- 1997: OM release on Macintosh Common Lisp (MCL)
- 2003: 1st Linux attempt = OM 4 on CMUCL
- 2005: OM on Mac/Windows. OM-API (AllegroCL / MCL)
- 2006 2nd Linux attempt = OM 5 on SBCL
- 2008: OM 6 on LispWorks ...

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- 2008: OM 6 on LispWorks
- 2013: Linux-support - OM 6 on LispWorks

LINUX PORT PROJECT

- Started 2013
- Supported by BEK
Bergen Center for Electronic Arts
<http://www.bek.no>
- In line with recent OM developments
(modular code + APIs, optional external dependencies)



OM, WHY LINUX? (MOTIVATIONS)

- Useful addition to Linux sound/composition tools
- Good people - institutions, communities, users, devs
- Integrate with Linux apps (through eg. libraries), R&D
- Improve OpenMusic - general, independent (OS-es, hardware, libs...)

TECHNICAL CHALLENGES

- ① The OM general architecture is portable across platforms:
 - kernel is 100% ANSI Common Lisp
 - = *easy*
- ② Other dependencies:
 - windowing & GUI toolkits to build the visual language and editors
 - I/O and rendering (MIDI, Audio, OSC. . .)
 - = *not so easy*

GUI

OM is a visual programming environment, and highly dependent on graphical user interfaces:

- patching, programming
- editors
- visual feedback
- Lisp interaction, control
- cross-referencing, interactive help-system. . .

GUI

OM 6 uses LispWorks' **CAPi** interface:

= “cross-toolkit” (Gtk, Cocoa, Windows...)

⇒ only moderate tweaks needed to adapt OM 6 to LW-Linux:

- text-fonts (text-panes, comments)
- dimensions, screen-resolution

I/O AND RENDERING

- Attempt to port old solutions = no good
- LibAudioStream? (already in use on other platforms...)
- Alsa? Linux-native
- \Rightarrow More general solutions: Lisp, JACK, Port...

I/O AND RENDERING - MIDI:

MidiShare replacement:

- **Midifile (SMF) R/W** \Rightarrow CL-MIDI (message formatting, file I/O)
- **Scheduling** \Rightarrow OM's new internal scheduler, JACK scheduler, other schedulers (SC3)
- **Communication** \Rightarrow Jack, PortMidi

I/O AND RENDERING - AUDIO:

LibAudioStream replacement:

- **File I/O** \Rightarrow **libsndfile** Lisp wrapper
- **scheduling and rendering** \Rightarrow **Jack**: client, ports, hw, I/O buffering, callback-engine

CL JACK-CLIENT

CL-Jack client - MIDI & Audio I/O & scheduling

- self-contained (CL + CFFI)
- AUDIO + MIDI I/O (hw, external apps)
- Scheduling, queues, buffers (CL and libjack)
- Callbacks programmable in CL

News (30. april 2014): PortMidi substitute for CL-Jack MIDI client in current download.

OFFSPRINGS

Example clients, hooks, callbacks, external processes:

- **mplayer** - subprocess-control
- **SuperCollider** client (OSC)
 - control (start, connection, operation)
 - I/O
 - callbacks on scheduler
- **Fluidsynth** client
 - internal softsynth

OFFSPRINGS

Plans. . .

- CCRMA-ware – CM, CLM, Sndlib

PACKAGING, DISTRIBUTION

- OM is LGPL (LW is not)
- .rpm - (sources + image, dependencies)
- .tar.bz2 - (sources & image)
- recipes for preparing **dpkg**-compliant packages at the forum:
<http://forumnet.ircam.fr/user-groups/openmusic/>
- dists?

STATUS MAY 2014

- Working Linux-port
- No (known) big obstacles
- common source-tree for all 3 platforms
 - modular code + APIs \Rightarrow reusability
 - dependencies less strict \Rightarrow user/programmer choices

GET INVOLVED

Further development depends on involvement:

- Users - feedback, bug-fixing, ideas
- Linux-developers - OM + integration w. other tools
- Libraries, (eg. OM-SoX, LilyPond)
- IRCAM developer(s)

LINUX “*modus operandi*”

Typical Linux-based projects:

- open source projects (JACK, ALSA, Ardour, SuperCollider, Lilypond. . .)
- user-groups, sourceforge, github
- active participation on many levels:
 - pro
 - semi-pro
 - end-user involvement

CONCLUSIONS

- a functional Linux-port is provided
- x-platform OM is better OM
- new solutions useful on osx/win
- get good projects going - to further development

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BIG THANKS!

- BEK - <http://www.bek.no> - Trond Lossius
- ANR EFFICACe - ANR-13-JS02-0004-01
- Lisp-developers, CCRMA (Bill Schottstaedt, Rick Taube, others)
- Linux music community
 - Jack developers
 - beta-testers
- OM users, mailing-lists, forums

OpenMusic - Linux-port

Thanks for your attention!

`http://repmus.ircam.fr/openmusic/linux`

`http://forge.ircam.fr/p/OM6/downloads`